

412TW-PA-18455



# **TMAS 2 INDUSTRY DAY 412 TW TO BRIEFING 14 AUGUST 2018\_V1**

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**MIKE SEELOS  
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JOHN THEOLODIGY**

**AIR FORCE TEST CENTER  
EDWARDS AFB, CA**

**14 AUGUST 2018**

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412TW-PA-18455**

**412TH TEST WING  
EDWARDS AIR FORCE BASE, CALIFORNIA  
AIR FORCE MATERIEL COMMAND  
UNITED STATES AIR FORCE**

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# **412<sup>th</sup> Test Wing Task Order**

**Edwards Air Force Base, CA**



**TMAS-2 Industry Day  
14 August 2018**

**Mike Seelos  
Lt Col Eric Heigel  
John Theologidy**

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# ***412 Test Wing Task Order***

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- **412 TW Mission and Organization Overview**
  - **Major Task Element Requirements**
    - **412 Test Management Division (TMD)**
    - **412 Test Engineering Group (TENG)**
    - **412 Electronic Warfare Group (EWG)**
  - **Questions**
-

# 412<sup>th</sup> TW Mission

*Test and Evaluate Weapons Systems to Ensure  
War-winning Combat Capabilities*





# The 412<sup>th</sup> Test Wing (TW)

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412 TW  
Test Wing

412 CPTS  
Comptroller  
Squadron

WSA  
Wing Staff  
Agencies

## Groups / Divisions

412 CEG Civil Eng	412 MDG Medical	412 MSG Mission Support	412 EWG Electronic Warfare	412 MXG Maintenance	412 OG Operations	412 TENG Test Engineering	412 TMD Test Management	USAF TPS Test Pilot School	Plant 42 Palmdale
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## Combined Test Forces (CTFs)



Joint Strike Fighter  
461 FLTS



F-35



Raptor  
411 FLTS



F-22A



Global Power Bomber  
419 FLTS



B-1, B-2, B-52, C-12



Global Power Fighter  
416 FLTS



F-16, F-15SA



Global Reach  
418 FLTS



C-17, C-5, C-130,  
KC-46, KC-135



Global Vigilance  
452 FLTS



Global Hawk



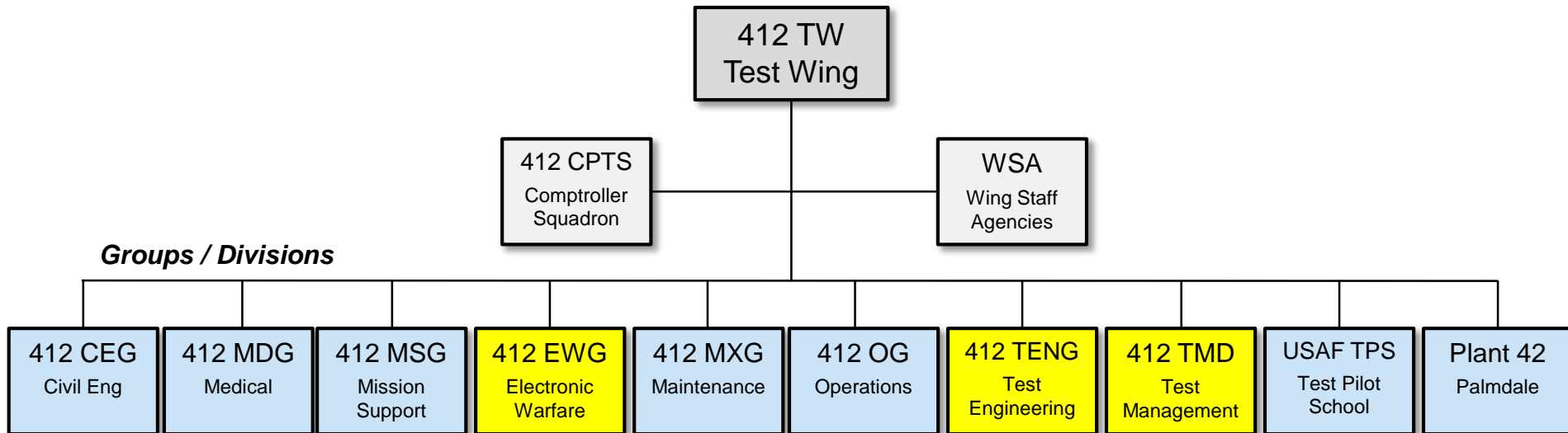
Operations Support  
412 OSS





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# A&AS for the 412 TW



## Combined Test Forces (CTFs)



# **Test Management Division Task Element**



**Mike Seelos  
14 Aug 2018**





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# 412 TMD Mission

**Deliver and sustain complete business and project management solutions to enable efficient, effective execution of the 412 TW Test and Evaluation mission**

## Train and Equip



### **Standard Process:**

412 TW PM Handbook  
412 TW Program Analyst Handbook

### **Standard Tools:**

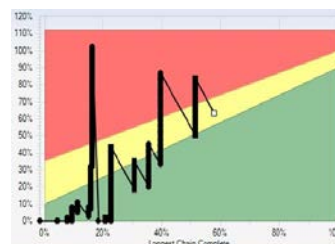
Project Cost Management Suite  
Concerto & Microsoft Project  
Consolidated Project List

### **Standard Training:**

PM Planning & Execution  
7 CBT Modules

## Execute and Manage

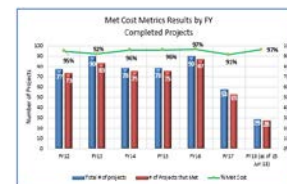
### **PERFORMANCE**



Cost

Schedule

## Deliver Results

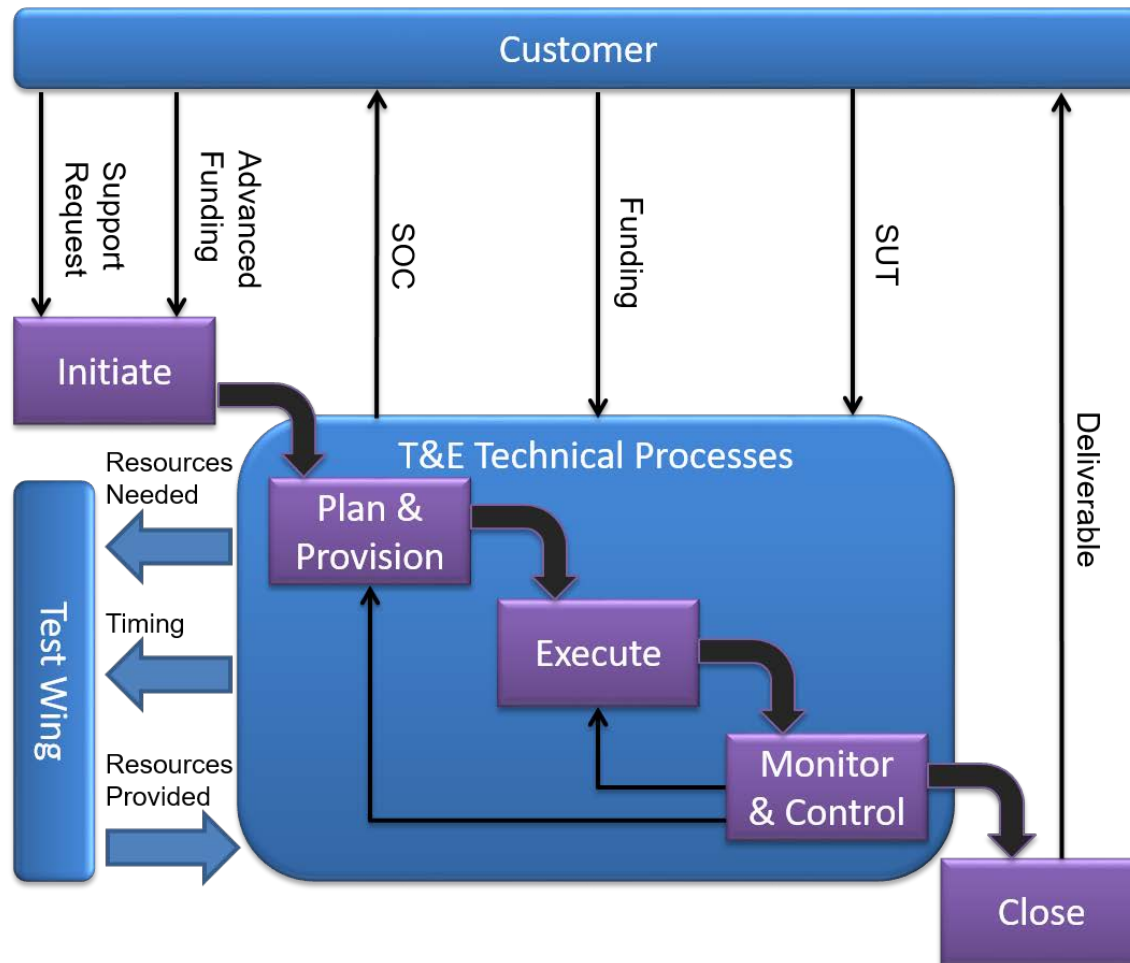


- Acquisition Milestones
- Fielding Decisions
- OT Certification
- Advanced HW buys



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# Project Management Process





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# ***Overall 412 TMD Task Element Requirements***

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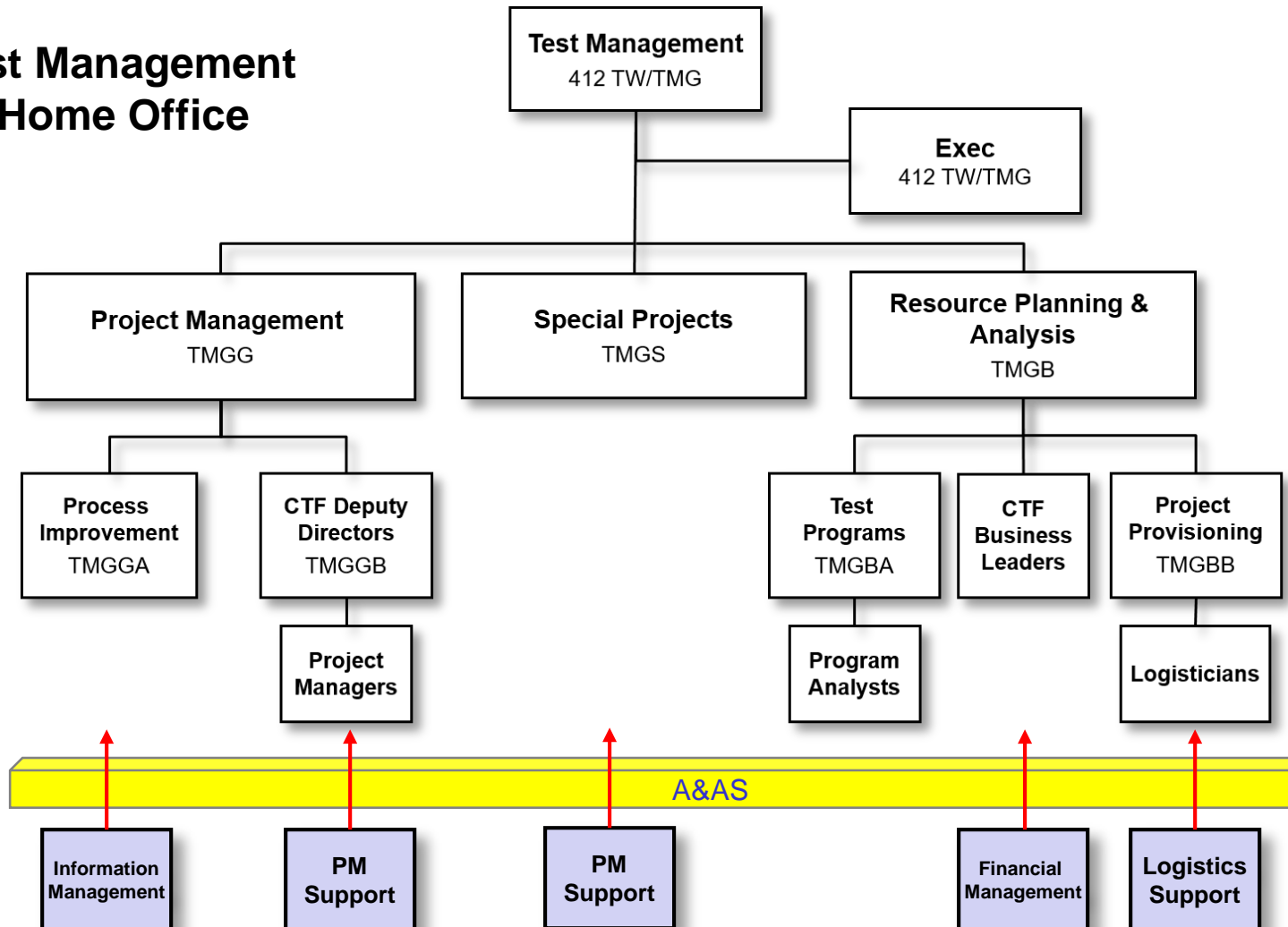
- **Advice and Advisory Services for 7+ CTFs and the Home Office**
    - Project Management Support (PMS)
    - Information Management Support (IMS)
    - Financial Management Support (FMS)
    - Engineering Technicians (ET)
    - Logistics Support (LS)
  - **Experience ranges from “Journey” to “Subject Matter Expert”**
    - Requires sound foundation in project management principles
    - Training for unique 412 Test Wing processes provided by TMD
  - **Work locations at Edwards AFB, CA and/or Plant 42, Palmdale**
  - **Ability to get an advanced security clearance a requirement for many positions**
    - Secret, Top Secret, Special Access Required (SAR) and Sensitive Compartmented Information (SCI)
-



# A&AS Support Within TMD

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## Test Management Home Office

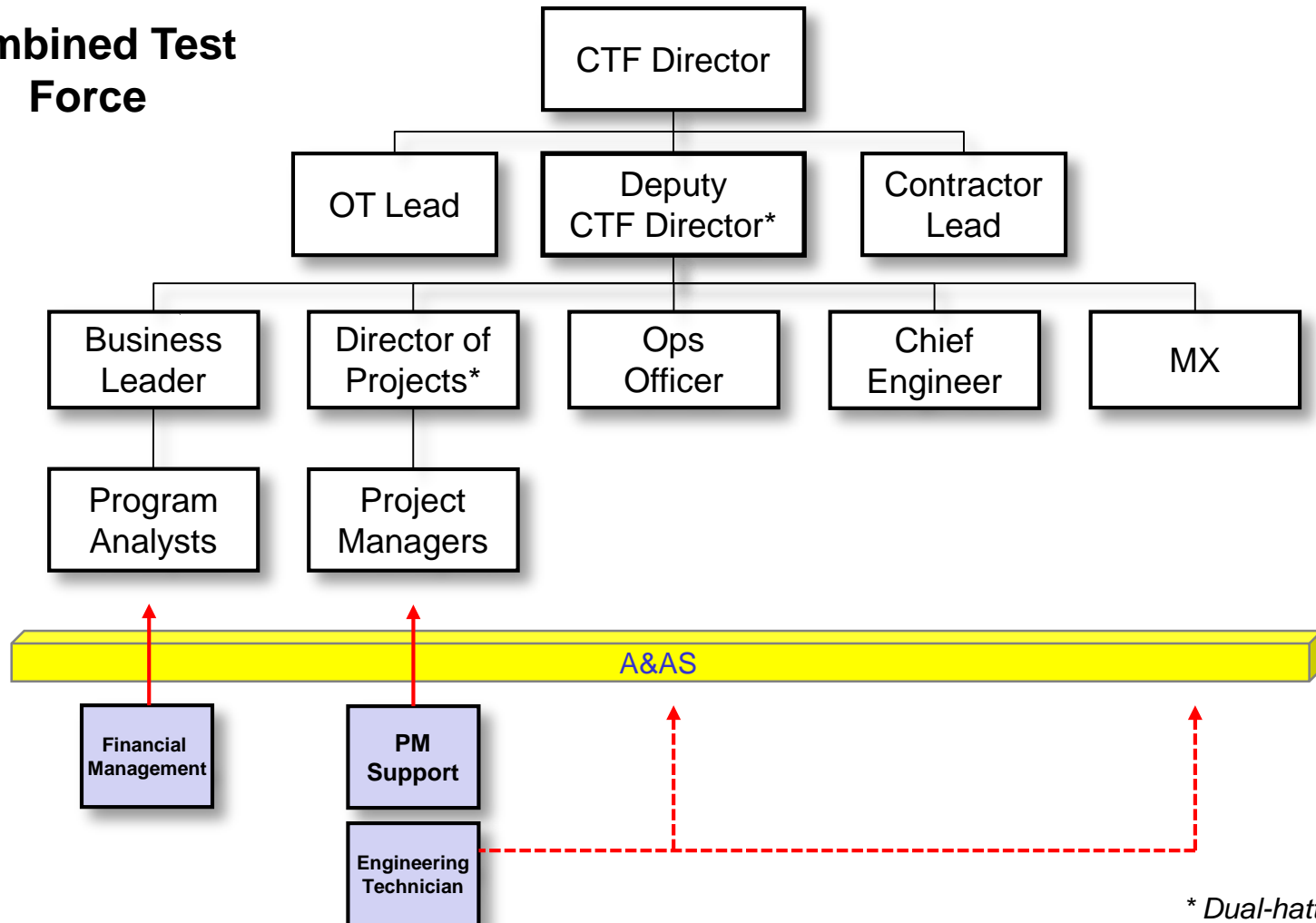




# A&AS Support Within CTFs

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## Combined Test Force





# ***TMG A&AS Support***

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- **Test Management / Project Management Support**
    - **Provide technical and programmatic support to the CTF test project managers**
    - **Assist developing system ground and flight test schedule and resource requirements**
    - **Planning and implementation**
      - **Test Concept Documents**
      - **Statements of Capability**
      - **Test and Evaluation Master Plans**
    - **Requires mixture of PM skills and specific system expertise**
-



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# ***TMG A&AS Support***

## **■ Information Management Support**

- Sustainment of a Theory of Constraints (e.g. Critical Chain) based project management system**
  - Process development & improvement**
  - Portfolio (multi-project) scheduling**
  - Project management training**
    - Development and sustainment of training materials**
    - Classroom and Computer Based Training (CBT) delivery**
    - Schedule and provide initial, recurring, and delta training**
  - Implementation of program management tools**
    - Concerto and a Project Cost Management System (PCMS)**
-



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# ***TMG A&AS Support***

## **■ Financial / Business Management Support**

- 412 TW business process support and improvement to:**
    - Support management of CTF flying hour program**
    - Assist in the development of capability and resource estimates for the CTF**
    - Support development of cost, schedule, performance and risk assessments**
    - Support Ad-hoc Cost studies and analysis**
-





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# ***TMG A&AS Support***

- **Engineering Technicians (ET) Support**
    - **Provide technical support, conduct data analysis and applies knowledge of engineering technology**
    - **Support tasks including but not limited to test and evaluation, test support, operation analyses and support activities**
    - **Ensure operational safety, suitability and effectiveness**
    - **Example: Air Vehicle Management at CTFs**
-



# ***TMG A&AS Support***

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## **■ Logistics Support (LS)**

- Assist in managing facility construction projects associated with the bed down of new weapons systems**
  - Assist in budgetary requirements, development of facility requirements, planning detailed schedules, and identifying utility and configuration requirements**
  - Support development of technical documentation such as design packages, specifications, and drawings**
  - Assist in planning and designing activities for space, resource and equipment utilization, storage and disposal**
-



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# *TMD A&AS Support*

## **Questions?**

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# **Test Engineering Group Task Element**



**Lt Col Eric Heigel  
14 Aug 2018**



# ***412 TENG Mission***

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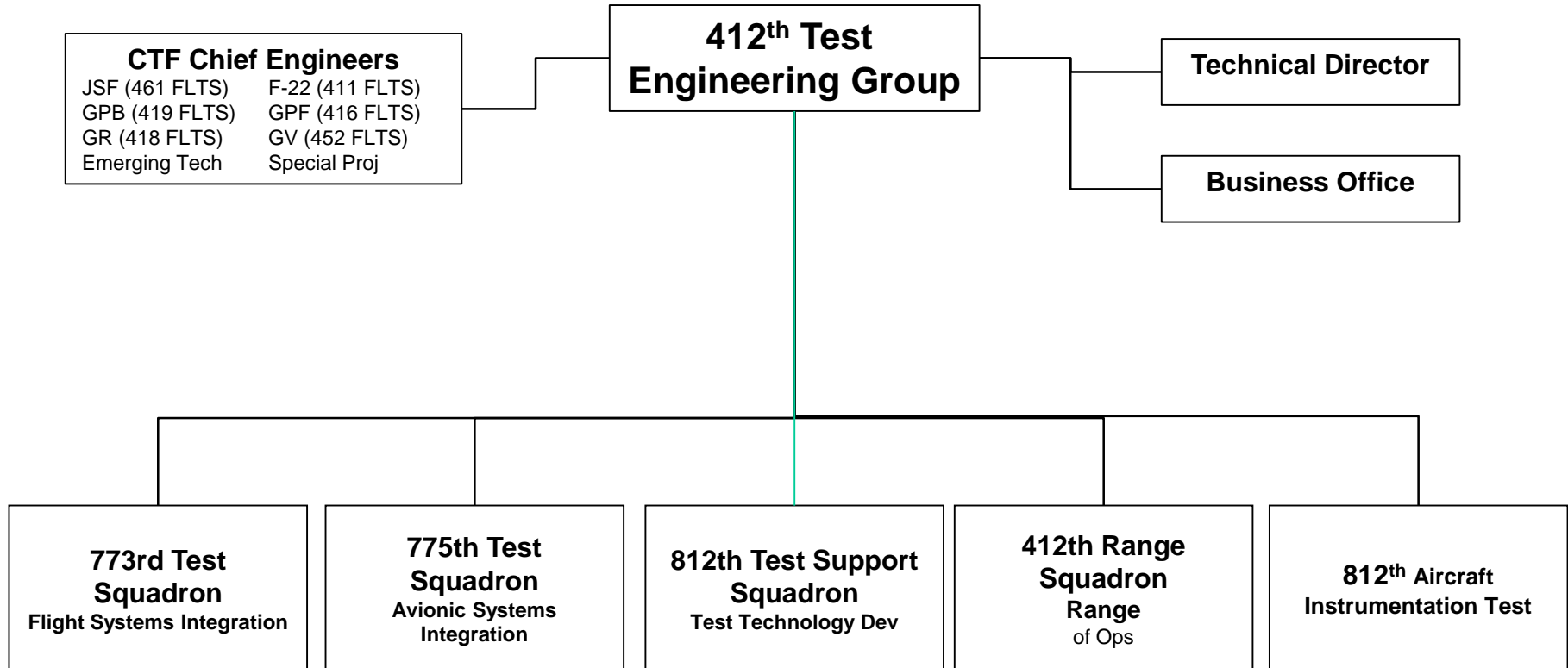
## **Manage T&E Engineering Core Competency in Airframe-Propulsion-Avionics (APA), Range, Instrumentation**

- **Provide test and evaluation (T&E) engineering expertise**
    - **Manage T&E engineering resources (Home Office/Matrix Personnel)**
      - Recruitment/Retention efforts
    - **Provide career guidance, mentoring, education and training for engineers, mathematicians, and scientists**
  - **Plan, conduct, analyze, and report test results**
    - **Work closely with customers on level of support**
  - **Define requirements for and assist in the development of T&E infrastructure**
    - AFTC/412th Test Wing Systems Engineering process (OI series)
  - **Operate and maintain the Edwards Flight Test Range**
  - **Provide airborne instrumentation systems and technical expertise**
  - **JTECH II (JT4) Program Office responsibilities**
-



# 412th TENG Leadership

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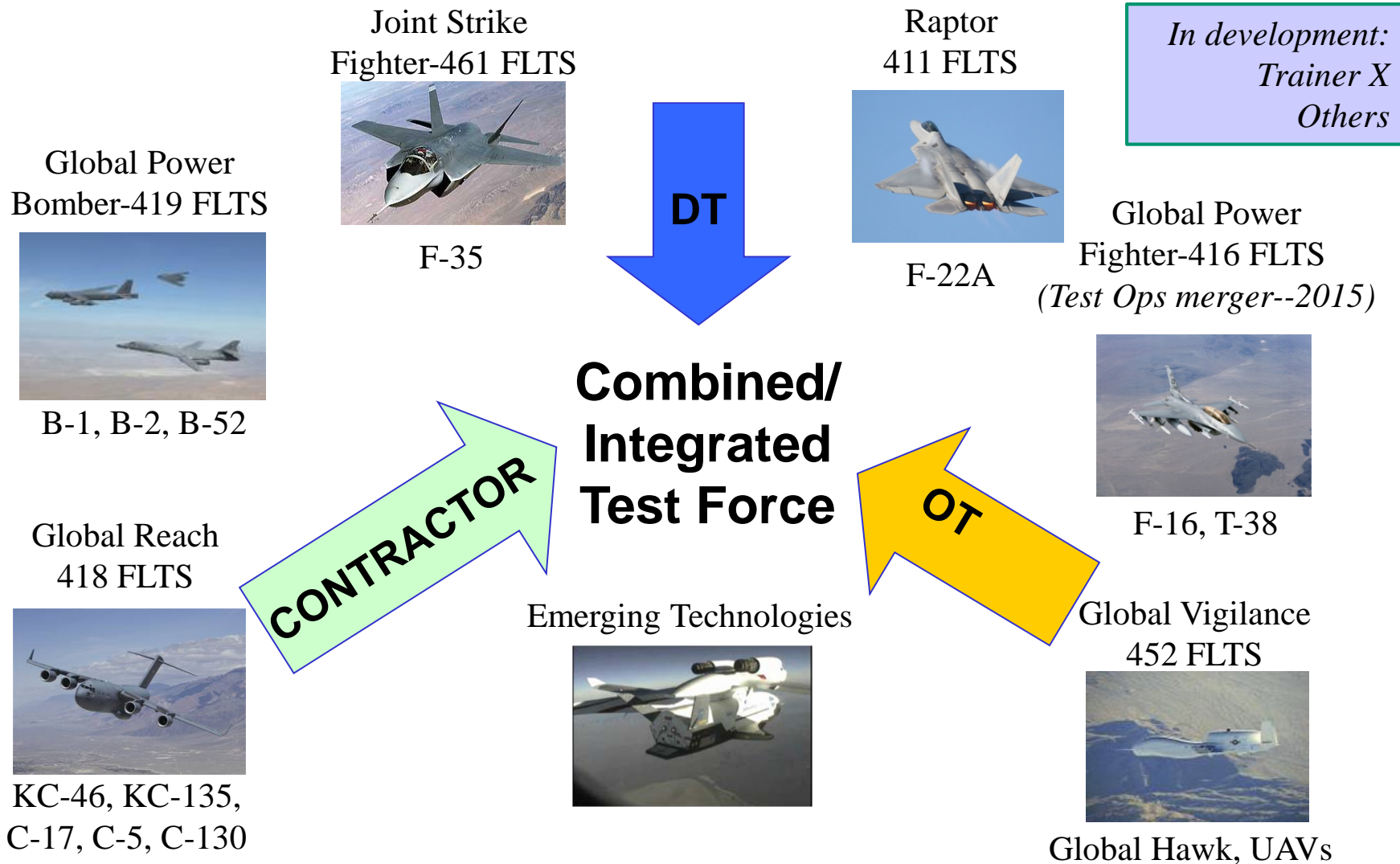


Overall assigned Manpower: ~ 1000 Combined Work Force



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# CTF/ITF Construct





# **773<sup>rd</sup> & 775<sup>th</sup> Test Squadrons**

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- **Intellectual capital**
  - Assigned to various Combined/Integrated Test Forces
- **Technical & safety planning**
  - Define objectives and test methodology; Identify and mitigate test risk
- **Conduct tests from mission control room, onboard aircraft, etc.**
- **Review data, evaluate system performance**
- **Report conclusions and recommendations (~100 reports/yr)**

### **773 TS**

- **Flying Qualities & Performance**
  - **Autonomy**
- **Subsystems & Aerial Refueling**
- **All Weather and In-flight Icing**
- **Human Factors**
- **Parachutes/Aerial Delivery**
- **Propulsion**
- **Reliability & Maintainability**
- **Structures**

### **775 TS**

- **Integrated Avionics**
  - **Communications**
  - **Navigation, Guidance & Control**
  - **C4ISR**
  - **Network Centric Warfare**
  - **Cyber Security/Information Assurance**
  - **EO/IR**
  - **Radar**
  - **Weapons Integration**
-





# 812 TSS, 412 RANS & 812 ENI

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## 812<sup>th</sup> Test Support Squadron

- **Technology Development/Acquisition**
  - Range Infrastructure
  - Airborne Instrumentation
  - Test Techniques
- **Statistical Office**
- **Engineering Development Office**
- **Technical Library**

## 812<sup>th</sup> Instrumentation Squadron

- **T-2 Modifications**
  - Design & Prototype
  - Fabrication & Installation
- **Operations**
  - Test aircraft
  - Support fleet (GSF)



## 412<sup>th</sup> Range Squadron

- **Ridley Mission Control Center**
- **Telemetry Systems, Mission Control Rooms**
- **Precision Impact Range Area (PIRA)**
  - Gunnery, bombing, photo and infrared (IR) resolution targets, target vehicles
- **Laser Range Operations**
- **Time-Space-Positioning Information (TSPI) – CRIIS Integration efforts**





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# TENG A&AS Support

- **Support Development of Real-Time Systems**
  - Mission Control Rooms
  - Data Acquisition and Transport Systems
  - Telemetry (TM) Systems
  - Encryption/Decryption Systems
  - Data Decom Systems
  - Air to Ground Communication Systems
  - Mobile Systems
- **Support Range Instrumentation**
  - PIRA targets and vehicles
  - TSPI Pods and Sensors





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# ***TENG A&AS Support***

## **Questions?**

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# **Electronic Warfare Group Task Element**



**John Theologidy  
14 Aug 2018**



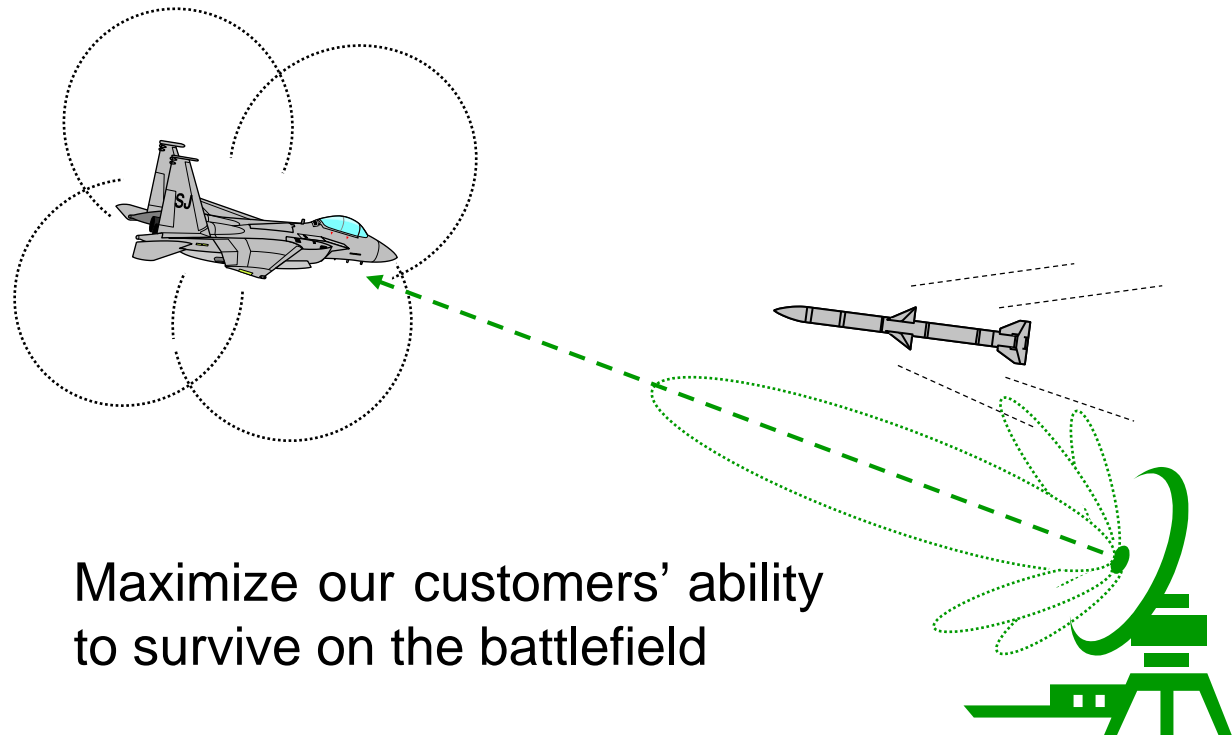
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# ***412 EWG Mission***

Provide our nation and its allies expertise and credible capabilities to perform survivability Test and Evaluation (T&E) ensuring our continued world-wide air dominance



**The testing of Electronic Warfare systems**



Maximize our customers' ability  
to survive on the battlefield





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# 412 EWG T&E

## Multi-Spectral Virtual EW Battlespace...

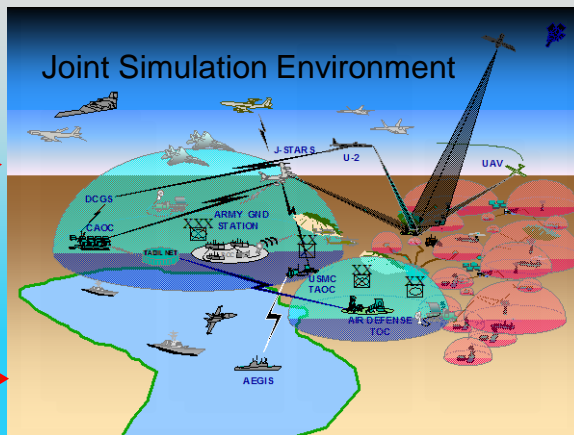
### Manned Flight Simulators



DIADS -C<sup>2</sup>



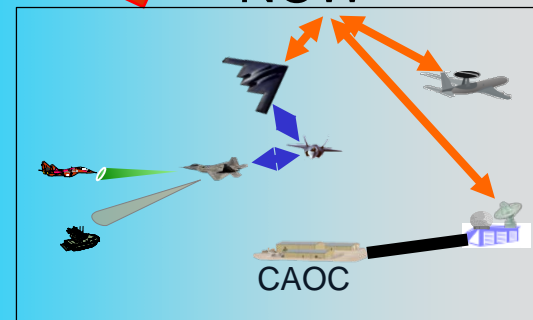
ADTRA



### Radar Targets-ARES



NCW



BAF



### Open-Air Range



Real World Tests Prior to Combat



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# ***Overall 412 EWG Task Element Requirements***

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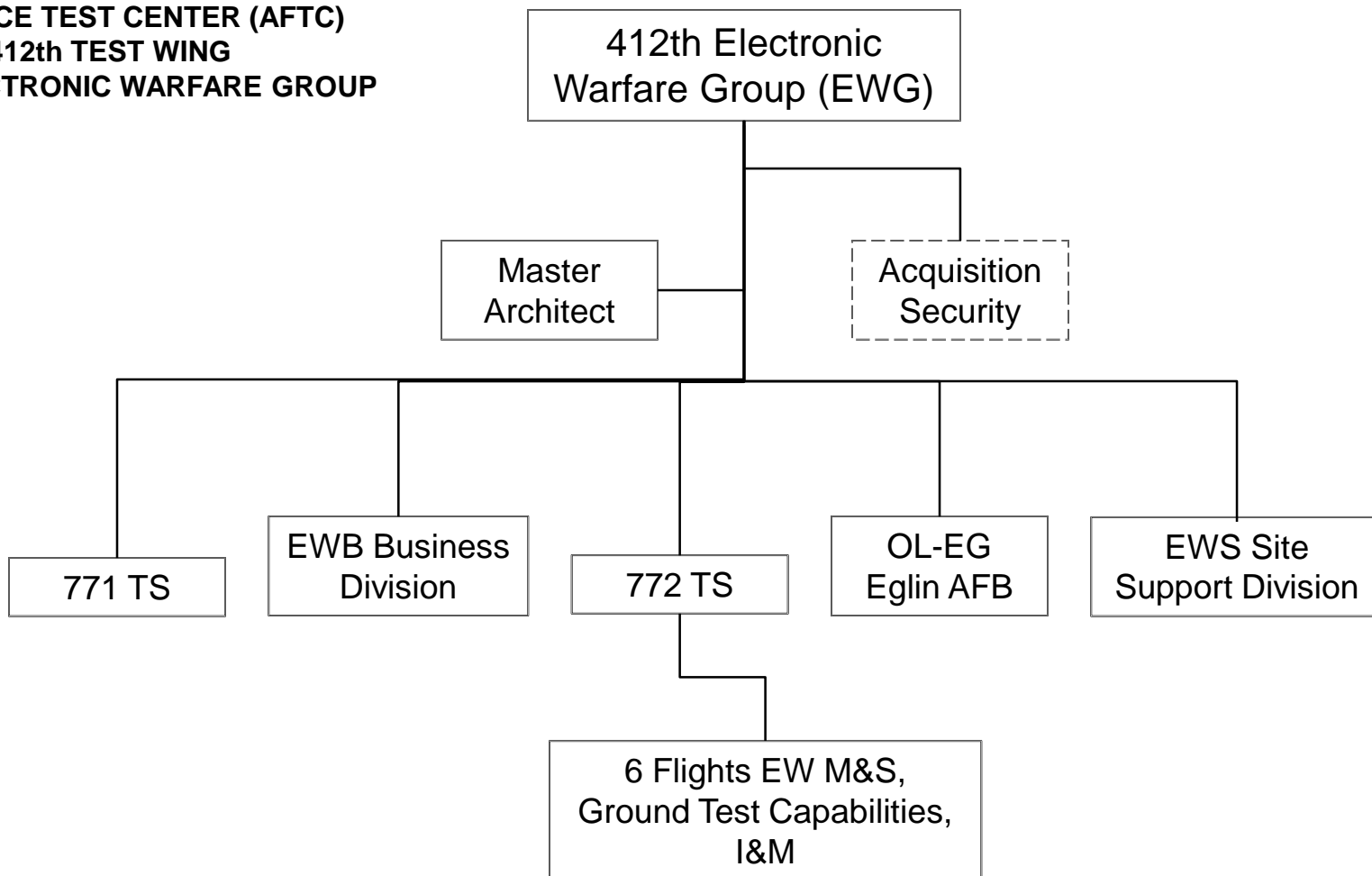
- **Systems Engineering and Technical Assistance (SE/TA)**
  - Expert advice and assistance required to support ground and flight test and related activities
  - Security-cleared personnel are available to provide continuous, uninterrupted support to the mission
  - T&E experienced workforce familiar with AFTC processes and procedures
- **Systems Engineering/Test Capability Planning / Investment / Development at the AFTC units and supported organizations**
  - AFTC EW range and infrastructure modernization program support
  - Support the integration of new or modified equipment and systems with existing capabilities
- **Test Mission Support at the AFTC and supported organizations**
- **Information Technology, Information Assurance, and Financial Management Support at the AFTC and supported organizations**



# 412 EWG Organization

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AIR FORCE MATERIEL COMMAND (AFMC)  
AIR FORCE TEST CENTER (AFTC)  
412th TEST WING  
412th ELECTRONIC WARFARE GROUP

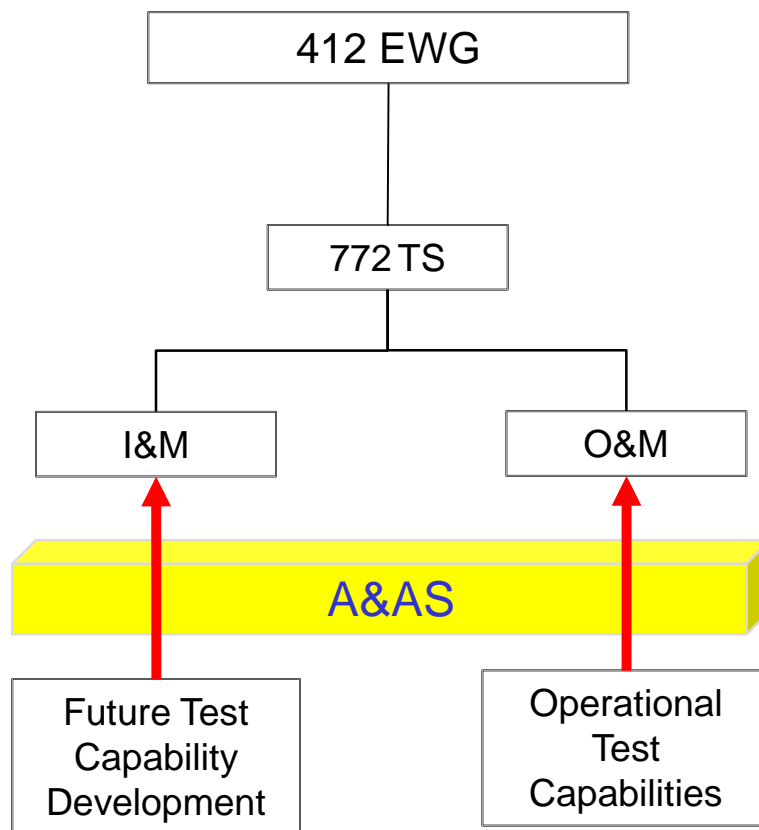






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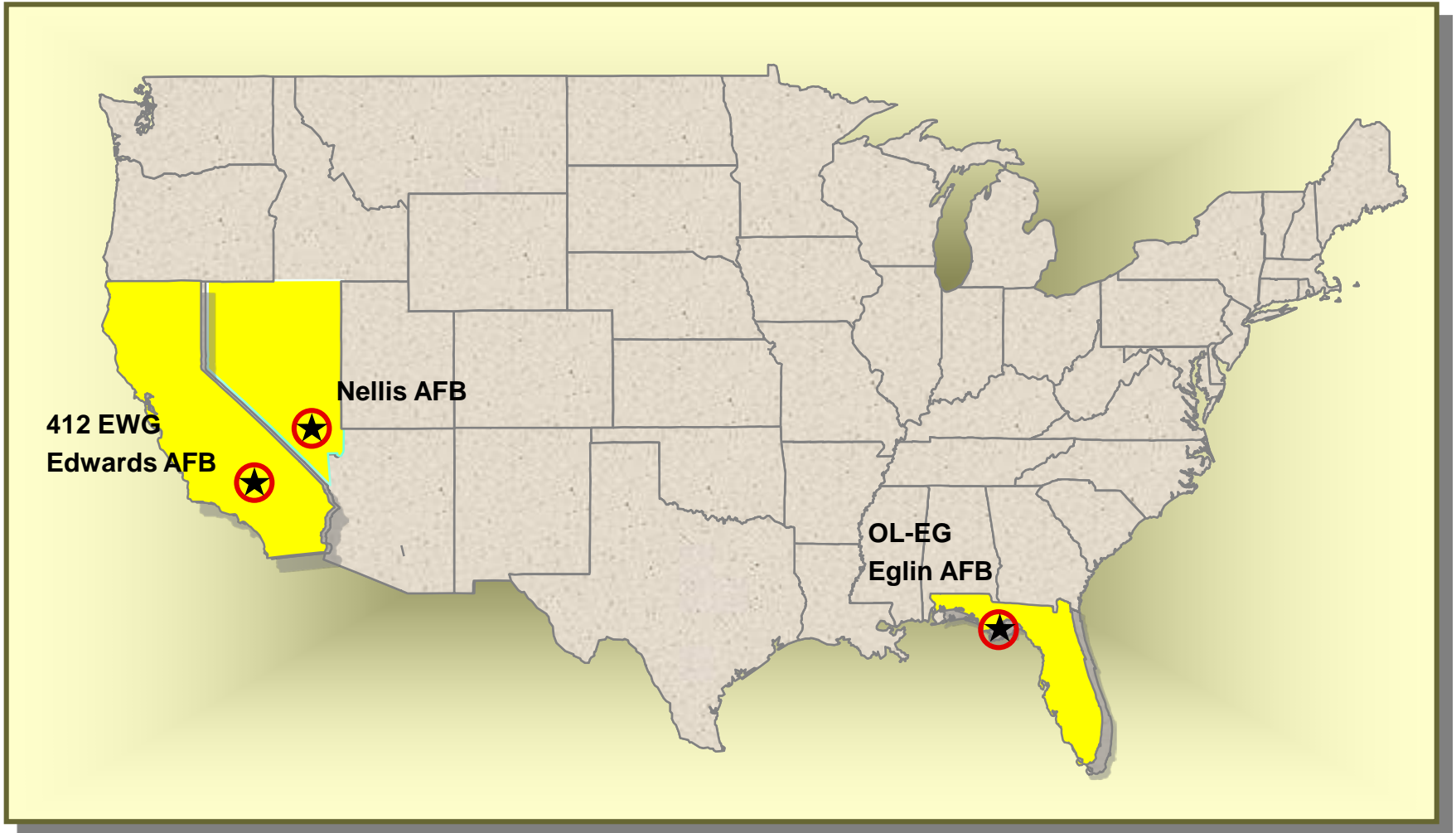
# 412 EWG Organization--Mission Execution





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# ***412 EWG Locations***

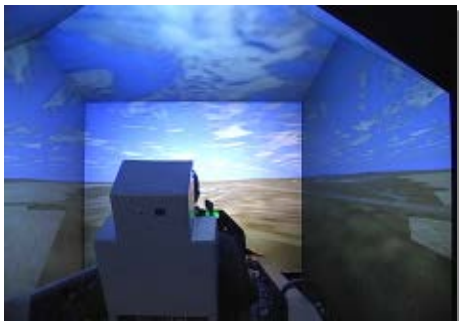




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# 412 EWG

## *EW Test & Evaluation (T&E) Facilities*



### TEMs

Test & Evaluation,  
Modeling and Simulation  
Digital Simulation



### EW Threat Simulators

Hardware-In-The-Loop



### IFAST

Integrated Facility for  
Avionic Systems Test  
Systems Integration Lab



### BAF

Benefield Anechoic Facility  
Installed Systems Test Facility



# 412 EWG Facilities

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## Benefield Anechoic Chamber

- GPS (pass through or simulation)
- EW Threat Simulation
- Comm, Nav, IFF (CNI)
- Antenna Patterns
- EMI/EMC
- Secure test environment for sensitive signals (SAP, SCI, war reserve modes)
- Credible “pedigree”
- Instrumentation





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# ***412 EWG Major Task Element Requirements***

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- **Systems engineering (SE)**
    - Strategic planning and program management support
    - Support Master Architect and Projects Development Division to plan, manage and execute T&E investment programs to develop test infrastructure via the Center's SE process; support EWG SEB process
    - Participate in Systems Engineering Team (SET) to provide assessments and recommendations on several programs
  - **Requirements definition on existing/new capability developments**
    - Interfaces with users, customers and other developers
    - Develop specs, acquisition & management documentation
  - **Developmental engineering**
    - Translate requirements into design solutions
    - Perform risk reduction & technical analysis activities
    - Provide technical insight to developmental activities
  - **Verification, validation and correlation support**
  - **Information Technology, Information Assurance, & Financial Management Support**
  - **Facility integration and upgrades (in support of new capabilities and test)**
-



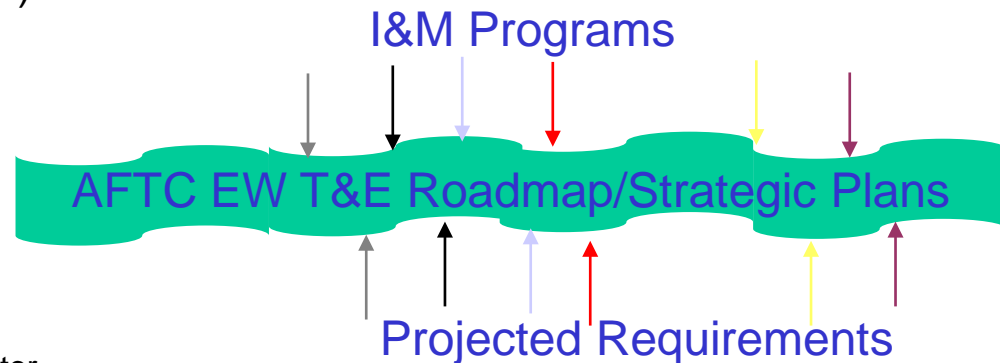
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# 412 EWG Major Task Element Requirements (cont.)

## *Improvement & Modernization (I&M) Current Support on Infrastructure Programs*

### ■ Sample Test Infrastructure Programs

- **ADTRA** (Advanced Dynamic Transmit Array)
- **AWTEC** (Advanced Warfare Test and Evaluation Capability)
- **CIMPLEX** (CEESIM\* Improvement & Modernization Program Lifecycle Extension)
- **DIADS** (Digital Integrated Air Defense System)
- **NEWEG** (Next Generation Electronic Warfare Environment Generator)
- **RAGE** (Radar Air to Ground Environment)
- **MSTC** (Mission System Test Capability)
- **JSE** (Joint Simulation Environment)



\*CEESIM--Combat Electromagnetic Environment Simulator

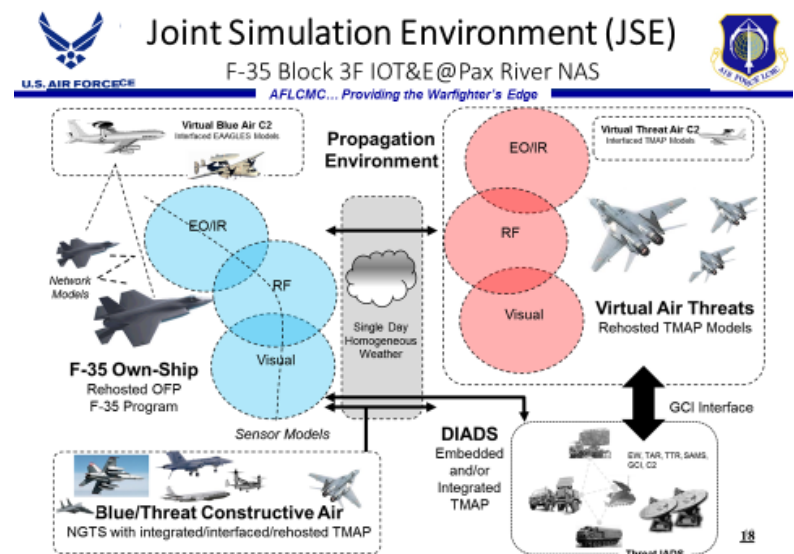
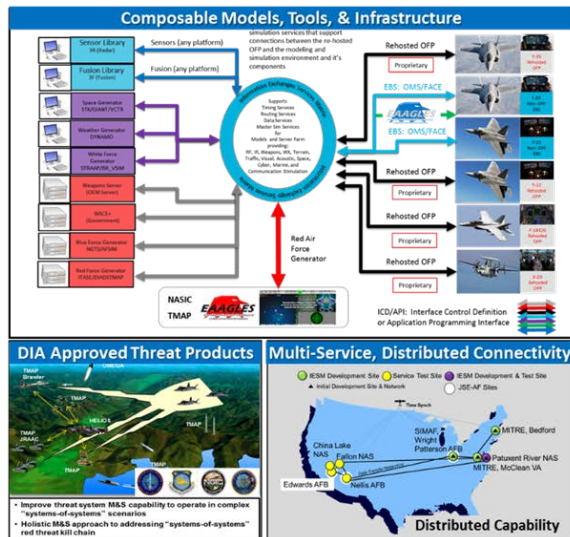




# Joint Simulation Environment (JSE) Activities

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- Establish / Development of JSE at Edwards and Nellis
  - 2xMILCON, acq/dev H/M/L fidelity sim, JSE architecture dev
- Provide day-to-day support for DT/OT in sim environment
  - Computer Scientist (i.e. re-host OFP, EBS dev, )
  - Engineers (i.e. sim operators, test scenario set up, ...)
  - PM, BFM, Facilities, and Security support



Integrity - Service - Excellence



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# 412 EWG T&E

## End-States

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- **“One Stop Shop” – but we don’t necessarily own it all!**
  - Systems Engineering Council (cross-functional issues like NCW/NCO)
  - Integrated ground/flight test to increase OAR efficiency
  - Requirements validation w/customer base
- **Affordable – cost effective risk management**
  - Rapid Improvement Events (efficiency upgrades)
  - System Integration
  - Leverage Combined Test Force’s (CTF’s) to vet requirements/gain funding support (e.g. quick look tool set)
  - Leverage CTFs to drive BAF OAR-like data products to leverage a common 771st tool set





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# 412 EWG Summary

- EW is a dynamic and diverse organization with unique interfaces to other organizations

*“Survivability is our responsibility”*

- Strong emphasis on systems engineering in all developmental programs
  - Responsible for development of a broad range of complex I&M programs
  - Many current and future challenges to improve and develop advanced infrastructure to test tomorrow's weapon systems
-



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# ***412 EWG Task Element***

## **Questions?**